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L4: Entry 1 of 3

File: JPAB

Jan 29, 2002

PUB-NO: JP02002029225A

DOCUMENT-IDENTIFIER: JP 2002029225 A

TITLE: PNEUMATIC TIRE

PUBN-DATE: January 29, 2002

## INVENTOR-INFORMATION:

NAME

COUNTRY

MATSUMOTO, HIROYUKI

## ASSIGNEE-INFORMATION:

NAME

COUNTRY

TOYO TIRE &amp; RUBBER CO LTD

APPL-NO: JP2000215730

APPL-DATE: July 17, 2000

INT-CL (IPC): B60 C 11/12

## ABSTRACT:

PROBLEM TO BE SOLVED: To provide a pneumatic tire capable of making improvement in braking force and uneven abrasion prevention of a driving wheel compatible with each other by giving directiveness to the rigidity of the circumferential land part.

SOLUTION: This pneumatic tire has single or plural rows of circumferential land parts 10 disposed in the vicinity of the tire equator CL of the tread surface T having designation of rotating direction and extending in the circumferential direction. The circumferential land part 10 is provided with plural substantially V-shaped sipes 11 formed so that the reference line B is expanded toward the post-rotation landing side. The circumferential length of the circumferential land part 10 is three times or more as large as the width thereof.

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L4: Entry 2 of 3

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L4: Entry 3 of 3

File: DWPI

Jan 29, 2002

DERWENT-ACC-NO: 2002-311219

DERWENT-WEEK: 200263

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TITLE: Pneumatic tire includes peripheral direction convex portion with several V-shaped sipes formed on tread surface, which has length larger than that of width

PATENT-ASSIGNEE:

ASSIGNEE

CODE

TOYO RUBBER IND CO LTD

TOYF

PRIORITY-DATA: 2000JP-0215730 (July 17, 2000)

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PATENT-FAMILY:

PUB-NO

PUB-DATE

LANGUAGE

PAGES

MAIN-IPC

JP 2002029225 A

January 29, 2002

006

B60C011/12

APPLICATION-DATA:

PUB-NO

APPL-DATE

APPL-NO

DESCRIPTOR

JP2002029225A

July 17, 2000

2000JP-0215730

INT-CL (IPC): B60 C 11/12

ABSTRACTED-PUB-NO: JP2002029225A

BASIC-ABSTRACT:

NOVELTY - Peripheral direction convex portion (10) formed on the tread surface (T) of the tire has several V-shaped sipes (11) each having two ground lines. The length of the convex portion is three times the width of the convex portion.

USE - Pneumatic tire.

ADVANTAGE - Improves reconciliation of damping force and prevents adhesion of driving wheel.

DESCRIPTION OF DRAWING(S) - The figure shows the front elevation view of tread surface of the pneumatic tire.

Peripheral direction convex portion 10

V-shaped sipes 11

Tread surface of tire T

CHOSEN-DRAWING: Dwg.3/7

TITLE-TERMS: PNEUMATIC PERIPHERAL DIRECTION CONVEX PORTION SHAPE FORMING TREAD  
SURFACE LENGTH LARGER WIDTH

DERWENT-CLASS: A95 Q11

CPI-CODES: A12-T01B;

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Q9212 ; K9416

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B 6 0 C 11/12

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テ-マコ-ト\* (参考)

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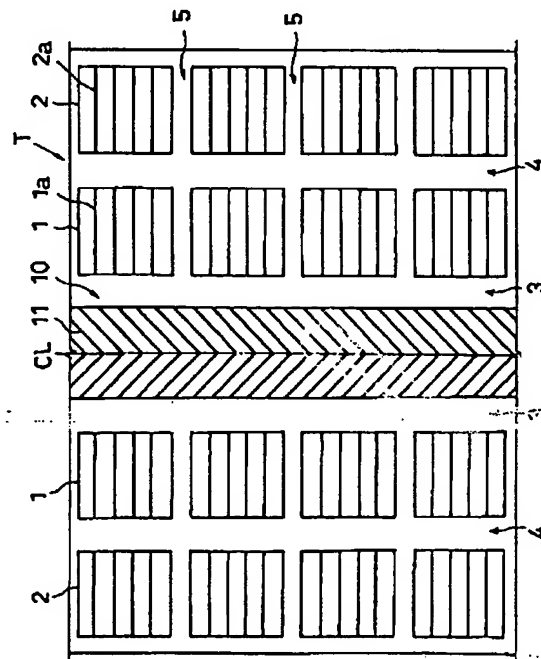
弁理士 鈴木 崇生 (外4名)

(54) 【発明の名称】 空気入りタイヤ

(57) 【要約】

【課題】 周方向陸部の剛性に方向性を持たせることで、制動力の向上と駆動輪の縞摩耗防止等とを両立させることができる空気入りタイヤを提供する。

【解決手段】 回転方向指定を有するトレッド面Tのタイヤ赤道CL付近に配置され、周方向に延びる単数列又は複数列の周方向陸部10を有する空気入りタイヤであって、前記周方向陸部10は、基準線Bが回転後着側に広がる略V字状のサイブ11を複数形成してあると共に、前記周方向陸部10の周方向長さが幅の3倍以上である。



## 【特許請求の範囲】

【請求項1】 回転方向指定を有するトレッド面のタイヤ赤道付近に配置され、周方向に延びる単数列又は複数列の周方向陸部を有する空気入りタイヤであって、前記周方向陸部は、基準線が回転後着側に広がる略V字状のサイプを複数形成してあると共に、前記周方向陸部の周方向長さが幅の3倍以上である空気入りタイヤ。

【請求項2】 前記周方向陸部は、分割溝を介さずに全周にわたって連続している請求項1記載の空気入りタイヤ。

【請求項3】 前記サイプは2本の基準線を有し、その基準線はタイヤ赤道に対して30°～60°の角度にて、タイヤ赤道に対称な角度をなしている請求項1又は2に記載の空気入りタイヤ。

【請求項4】 前記サイプは周方向の間隔が3～6mmである請求項1～3いずれかに記載の空気入りタイヤ。

## 【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、タイヤセンター（赤道）付近に配置され周方向に延びる周方向陸部に、略V字状のサイプを複数形成してある回転方向指定型のトレッドパターンを備える空気入りタイヤに関する。

【0002】

【従来の技術】従来より、ドライ及びウエット路面での制動距離を短くするには、タイヤパターンのブロック剛性を高めることが有効であり、特にセンター部に剛性の高いリブを配置すると効果が高いことが知られている。これはブロック剛性を上げることで、制動時の反力が大きくなる等のためであり、特にセンター部における剛性向上の影響が大きい。

【0003】また、スノートラクションの向上には、ブロック剛性を下げて柔軟性を持たせることが有効であり、また特に、後輪駆動車の駆動輪では、センター部の摩耗傾向が強まるため、センター部の剛性が低い方がよいことが知られている。

【0004】このように、ブロック剛性を高めることは、制動力向上のためには有利でも、スノートラクションの向上には不利に働き、両者の解決方法は相反するという事実があった。また、センター部に剛性の高いリブを配置して制動力を向上させる方法も、駆動輪の縞摩耗防止には不利に働き、両者の解決方法は相反するものであった。

【0005】一方、特開平3-10913号公報には、スノートラクション等を向上させるべく、周方向主溝と副溝によって区分されたブロックに山型（V型）の浅い切り込み（サイプ）を入れた空気入りタイヤが開示されている。その他、これと同様に周方向長さが短いブロックにV型のサイプを設けた空気入りタイヤが、幾つか知られている。

【0006】

【発明が解決しようとする課題】しかしながら、上記のタイヤは何れも回転方向指定型ではないため、V型サイプが逆方向に複数列形成されており、制動時と駆動時との応力方向の違いによってV型サイプの機能の使い分けができなかった。また、本発明者らによると、公知技術のように周方向長さが短いブロックにV型サイプを設ける場合、応力方向を変えても剛性の向上効果が極めて小さいことが判明した。

【0007】そこで、本発明の目的は、周方向陸部の剛性に方向性を持たせることで、制動力の向上と駆動輪の縞摩耗防止等とを両立させることができる空気入りタイヤを提供することにある。

【0008】

【課題を解決するための手段】本発明者らは、上記目的を達成すべく、回転方向指定型のトレッドパターンの陸部剛性に方向性を持たせる方法について鋭意研究したところ、基準線が回転後着側に広がる略V字状のサイプを周方向陸部に複数形成することで、陸部剛性に方向性を持たせることが可能なことを見出し、本発明を完成するに至った。

【0009】即ち、本発明の空気入りタイヤは、回転方向指定を有するトレッド面のタイヤ赤道付近に配置され、周方向に延びる単数列又は複数列の周方向陸部を有する空気入りタイヤであって、前記周方向陸部は、基準線が回転後着側に広がる略V字状のサイプを複数形成してあると共に、前記周方向陸部の周方向長さが幅の3倍以上であることを特徴とする。ここで、タイヤ赤道付近とは、タイヤ赤道を中心とするトレッド幅の30%の範囲を指し、周方向陸部の中心線がその範囲内か否かで判断する。

【0010】上記において、前記周方向陸部は、分割溝を介さずに全周にわたって連続していることが好ましい。

【0011】また、前記サイプは2本の基準線を有し、その基準線はタイヤ赤道に対して30°～60°の角度にて、タイヤ赤道に対称な角度をなしていることが好ましい。更に、前記サイプは周方向の間隔が3～6mmであることが好ましい。

【0012】〔作用効果〕本発明によると、基準線が回転後着側に広がる略V字状のサイプを周方向陸部に複数形成してあるため、図1のFEM解析（有限要素法）の結果が示すように、制動時と駆動時の応力方向の相違によって、周方向陸部の前後剛性が大きく変化する（6%）ことが判明した。これに対して子午線方向（幅方向）の一般サイプでは、前後剛性が全く変化せず、周方向長さが短いブロックにV型サイプを設けたものでは、前後剛性の変化が小さかった（1%）。その理由の詳細は不明であるが、制動時には図2（a）の矢印の方向に応力（外力）が生じ、周方向陸部10Aは周方向陸部10Bのようにサイプの角度が広がる変形が生じるのに対し、

し、駆動時には図2(b)の周方向陸部10Cのように角度が狭まる変形が生じ、その際の各部の拘束力の違いによって前後剛性の変化が生じると推定される。そして、このような前後剛性の変化によって、実施例の結果が示すように、制動力の向上と駆動輪の編摩耗防止等とを両立させることができる。なお、このFEM解析のモデル条件は、次の通りである。

【0013】本発明品：図2に示す周方向陸部において、陸部幅25mm、陸部高さ9.4mm、サイプの基準線(対称)の角度 $\alpha$ 45°、周方向の間隔b5mm、深さ8.0mmとした。一般サイプ品：図7(a)に示す周方向陸部において、陸部幅と高さは同上、サイプの基準線の角度 $\alpha$ 90°、周方向の間隔と深さも同上とした。ブロック品：本発明品の周方向陸部を分割溝により長さ25mm(周方向長さが幅の1倍)で分割したものの、

【0014】また、前記周方向陸部が分割溝を介さずに全周にわたって連続している場合、周方向陸部の周方向長さの幅に対する比率が大きいくほど、特に制動時の陸部剛性を高めることができるため、全周に連続するものでは上記の如き作用効果が特に顕著になる。

【0015】前記サイプは2本の基準線を有し、その基準線はタイヤ赤道に対して30°~60°の角度にて、タイヤ赤道に対称な角度をなしている場合、制動時と駆動時の応力方向の相違によって、周方向陸部の前後剛性をより大きく変化させることができる。

【0016】また、前記サイプの周方向の間隔が3~6mmである場合、適度な陸部剛性が得られるとともに、応力方向の相違による前後剛性の変化もより大きくすることができる。

【0017】

【発明の実施の形態】以下、本発明の実施の形態について、図面を参照しながら説明する。

【0018】本発明の空気入りタイヤは、図3に示すように、矢印の方向に回転方向指定を有するトレッド面Tのタイヤ赤道CL付近に、周方向に延びる単数列又は複数列の周方向陸部10が配置されている。本実施形態では、分割溝を介してブロック化していない、1本の連続する周方向陸部10がタイヤ赤道CL上に配置されている例を示す。

【0019】本発明は、周方向陸部10に特徴を有するため、その他のパターンは何れでもよく、例えば図3に示すブロックパターンが挙げられる。この例では、周方向陸部10はその両側に形成された2本の周方向溝3によって区画されている。周方向溝3の外側にはメディエイト部のブロック1が形成されており、このブロック1は周方向溝3と周方向溝4と幅方向に延びる幅方向溝5によって区画されている。ブロック1には幅方向サイプ1aが複数形成されている。周方向溝4の外側にはショルダー部のブロック2が形成されており、周方向溝4と

幅方向溝5によって区画されている。ブロック2には同様に幅方向サイプ2aが複数形成されている。

【0020】本発明では、図4に示すように、周方向陸部10に基準線Bが回転後着側(矢印の逆方向)に広がる略V字状のサイプ11を複数形成してある。図示した例ではサイプ11が直線のため基準線Bと一致している。サイプ11の2本の基準線Bとタイヤ赤道CLがなす角度 $\alpha$ は、前述した理由より、20°~70°の角度であることが好ましく、30°~60°の角度であることがより好ましく、40°~50°の角度であることが更に好ましい。また、2本の基準線Bがタイヤ赤道に対称な角度をなしていることが好ましい。

【0021】サイプ11の周方向の間隔bは、前述した理由より、2~9mmであることが好ましく、3~6mmであることが好ましい。なお、サイプ11の深さは、前述の如き作用効果を得る上で、2mmから周方向陸部10の高さと同じ深さまでが好ましい。周方向陸部10の幅は、制動性能と偏摩耗、スノートラクションを両立する上で、15~50mmが好ましい。

【0022】本発明の空気入りタイヤは、前述の如き作用効果を得る上で、ラジアルタイヤが好ましい。また、前述の制動性能を得る上で、ABS装着車用タイヤが好ましく、スノートラクション性能が高いためスノータイヤとしても有用である。

【0023】〔他の実施形態〕以下、本発明の他の実施の形態について説明する。

【0024】(1) 前述の実施形態では、分割溝を介さずに周方向に全周にわたって連続する周方向陸部を有するものの例を示したが、本発明における周方向陸部は、その周方向長さが幅の3倍以上であれば、分割溝を介して分割されていてもよい。但し、周方向長さが幅の5倍以上であることが好ましく、分割溝の数が少ない程好ましい。また、分割溝の形状は、略V字状のサイプに平行な溝が好ましい。

【0025】なお、本発明において、周方向陸部の周方向長さは周方向に平行な仮想線の両端部が最大となる長さを指し、周方向陸部の幅はタイヤ軸方向(トレッド幅方向)の両側の最端部を基準として測定する値を指す。

【0026】(2) 前述の実施形態では、図4に示す形状のサイプを形成する例を示したが、基準線が回転後着側に広がる略V字状のサイプであれば、図5(a)~(e)に示すような形状のサイプ等の何れでもよい。

【0027】図5(a)に示すものは、V字型の基準線Bに沿って、波形(ラメレン)のサイプ11aが左右両側に設けられたものである。図5(b)に示すものは、V字型の基準線Bに沿って、一方には直線のサイプ11が、他方には波形のサイプ11aが周方向に交互に設けられたものである。図5(c)に示すものは、V字型の基準線Bに沿って、一方には直線のサイプ11が端部まで、他方には直線のサイプ11bが端部付近まで交互に

設けられたものである。

【0028】また、図5(d)に示すものは、V字型の基準線Bに沿って、端部付近で屈曲したサイプ11cが左右両側に設けられたものである。図5(e)に示すものは、端部に近づくに従って基準線Bの角度aが徐々に大きくなる曲線のサイプ11dが左右両側に設けられたものである。

【0029】(3) 前述の実施形態では、図3に示す配置の1本の全周に連続する周方向陸部を設ける例を示したが、図6(a)～(b)に示すように、複数本の周方向陸部を設けてもよい。

【0030】図6(a)に示すものは、タイヤ赤道CL上の周方向溝6の両側に、2本の周方向陸部10を左右対称に設けた例であり、周方向溝3によって区画されている。また、サイプ11に平行な分割溝8によって周方向陸部10が周方向で8箇所まで分割されている。

【0031】図6(b)に示すものは、タイヤ赤道CL上の周方向陸部10の両側に、周方向溝7を介して、2本の周方向陸部10を更に設けた例(計3本)である。そして、中央の周方向陸部10のサイプ11と比較して、両側の周方向陸部10のサイプ11eは、基準線Bの角度aが大きくなっている。このように角度aを外側ほど大きくすることによって、タイヤセンター部の偏摩耗を好適に抑制することができる。

【0032】(4) 前述の実施形態では、周方向陸部以外のパターンが図3に示すブロックパターンである例を示したが、長方形のブロックに限らず、平行四辺形、V字型、五角形、又は曲線基調のブロックでもよい。また、中央付近や端部近傍まで溝の入ったブロックでもよく、サイプ形状も本発明の効果を減殺しないものであれば何れでもよい。また、周方向に連続する周方向リブなどを設けてもよい。

【0033】

【実施例】以下、本発明の構成と効果を具体的に示す実施例等について説明する。なお、タイヤの各性能評価は、次のようにして行った。

【0034】(1) ドライ アンド ウエットの制動性能

タイヤを実車(ABS装着車)に装着し、1名乗車の荷重条件にて、水深1mmのウエット路面とドライ路面(何れもアスファルト路面)とを走行させ、初速90km/hで制動力をかけて20km/hまで減速するのに要する距離を指数で評価した。なお、評価は従来品(比較例1)を100としたときの指数表示(ドライとウエットの平均値)で示し、数値が大きいほど良好な結果を

示す。

【0035】(2) センター部の偏摩耗性能  
タイヤを実車(FR車)に装着し、1名乗車の荷重条件で走行し、駆動輪について、平均摩耗量が50%に達したときの偏摩耗比(センター部の摩耗量/ショルダー部の摩耗量)を測定した。評価結果が1.0に近いほど、均一な摩耗であり、良好な結果を示す。

【0036】(3) スノートラクション性能

SAE-J1466に基づき、圧雪路において、スノートラクションテスターを用い、時速8km/hで走行し、スリップ率20～300%までのスリップ率～摩耗係数の平均値を取り込んだ(n=10個)。

【0037】実施例1

図3に示すトレッドパターンにおいて、周方向陸部10の幅25mm、陸部高さ9.4mm、サイプ11の基準線の角度a45°、周方向の間隔b5mm、深さ8.0mmとした。また、ブロック1のサイプ1aの基準線の角度a90°、周方向の間隔b5mm、深さ8.0mmとし、ブロック2のサイプ2aの基準線の角度a90°、周方向の間隔b5mm、深さ8.0mmとした。

【0038】このパターンをサイズ225/50R16のラジアルタイヤに採用し、上記の各性能評価を行った。その結果を表1に示す。

【0039】比較例1(従来品)

図7(a)に示すトレッドパターンにおいて、周方向陸部10の幅25mm、陸部高さ9.4mm、サイプ11の基準線の角度a90°、周方向の間隔b5mm、深さ8.0mmとした。他の部分は実施例1と同じであり、このパターンを同サイズのラジアルタイヤに採用し、上記の各性能評価を行った。その結果を表1に示す。

【0040】実施例2

図7(b)に示すトレッドパターンにおいて、周方向陸部10の幅25mm、陸部高さ9.4mm、サイプ11の基準線の角度a75°、周方向の間隔b5mm、深さ8.0mmとした。他の部分は実施例1と同じであり、このパターンを同サイズのラジアルタイヤに採用し、上記の各性能評価を行った。その結果を表1に示す。

【0041】比較例2

実施例1のトレッドパターンにおいて、周方向陸部10をサイプ11に平行なV型溝(幅5mm)によって、周方向長さ30mm毎に分割した以外は、実施例1と同様にしてラジアルタイヤを作製し、上記の各性能評価を行った。その結果を表1に示す。

【0042】

【表1】



	実施例1	比較例1	実施例2	比較例2
制動性能	105	100	103	96
偏摩耗性能	1.5	3.1	2.3	1.3
スノートラクション性能	103	100	101	105

表1の結果が示すように、本発明品では、制動力の向上と駆動輪の偏摩耗防止、スノートラクション性能とを両立させることができた。特にサイプの角度 $\alpha$ が30°～60°の範囲である実施例1では、その効果が顕著であった。一方、幅方向のサイプを形成した比較例1では、制動性能、偏摩耗性能、スノートラクション性能が何れも劣っており、また、周方向陸部をブロック化した比較例2では、ブロック化することで両方向の剛性が低下してスノートラクション性能、偏摩耗は向上するが、制動性能は向上せず、むしろ大幅に低下した。

【図面の簡単な説明】

【図1】本発明品と従来品のFEM解析の結果を示すグラフ

【図2】本発明における作用を説明するための説明図

【図3】本発明の空気入りタイヤの一例のトレッド面を\*

10\*示す正面図

【図4】図3のトレッド面の周方向陸部を示す要部拡大図

【図5】本発明におけるサイプの他の例を示す正面図

【図6】本発明における周方向陸部の他の例を示す正面図

【図7】実施例等で使用した空気入りタイヤのトレッド面を示す正面図

【符号の説明】

10 周方向陸部

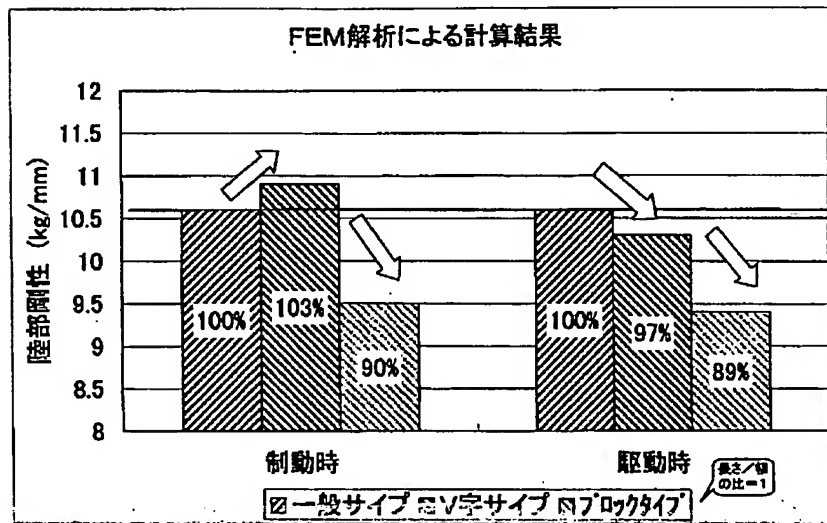
11 サイプ

B 基準線

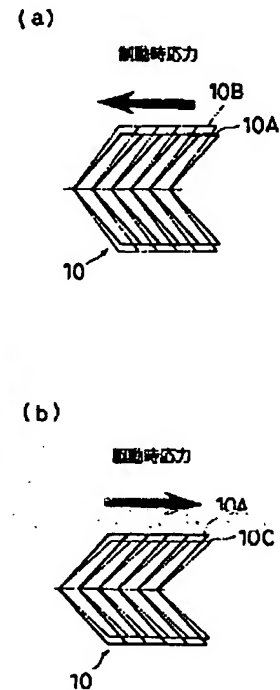
CL タイヤ赤道

T トレッド面

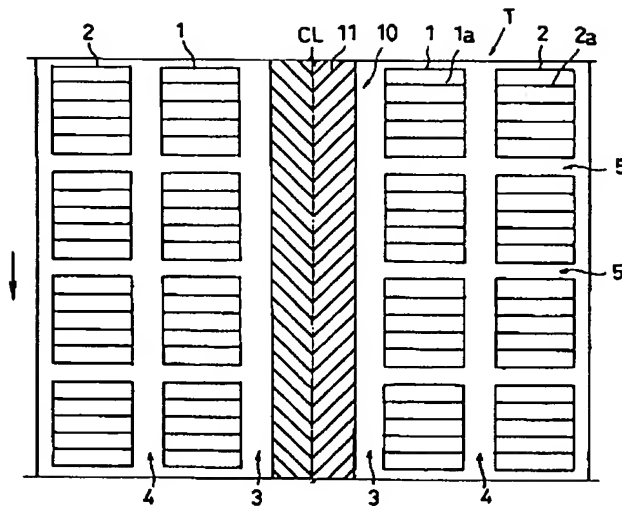
【図1】



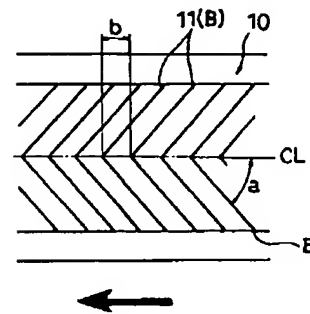
【図2】



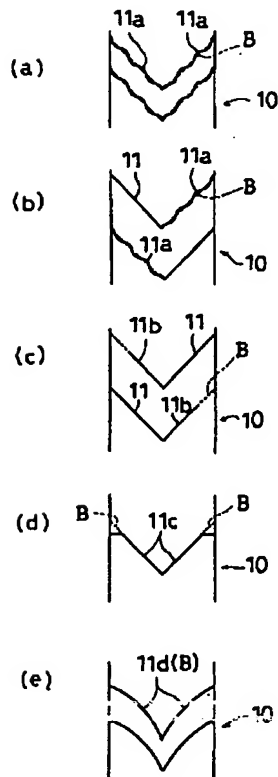
【図3】



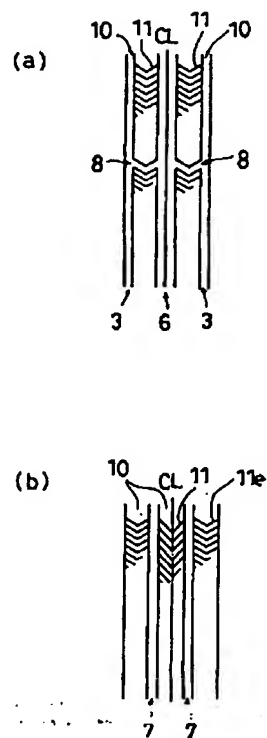
【図4】



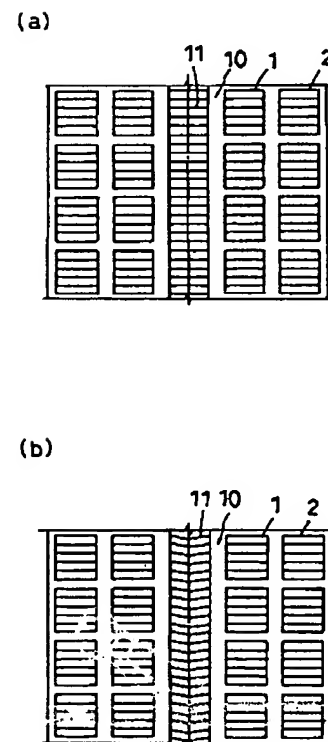
【図5】



【図6】



【図7】



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3. In the drawings, any words are not translated.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the pneumatic tire which equips the hoop direction land part which is arranged near a tire pin center, large (equator) and is prolonged in a hoop direction with the tread pattern of the hand-of-cut assignment mold which has formed two or more SAIPU of the letter of the abbreviation for V characters.

[0002]

[Description of the Prior Art] Conventionally, in order to shorten the brake stopping distance in dry cleaning and a wet road surface, if it is effective to raise the block rigidity of a tire pattern and it arranges a rigid high rib especially in the pin center, large section, it is known that effectiveness is high. It is raising block rigidity, and this is because the reaction force at the time of braking becomes large, and the effect of the rigid improvement especially in the pin center, large section is large.

[0003] Moreover, it is especially effective in improvement in the Snow traction to lower block rigidity and to give flexibility, and since the wear inclination of the pin center, large section becomes strong, it is known for the driving wheel of a rear drive vehicle that the one where the rigidity of the pin center, large section is lower is good.

[0004] Thus, even when it was advantageous for the improvement in damping force to have raised block rigidity, it worked disadvantageously for improvement in the Snow traction, and both solution approach had the fact of being contrary. Moreover, the approach of arranging a rigid high rib in the pin center, large section, and raising damping force also worked disadvantageously for \*\*\*\*\* prevention of a driving wheel, and both solution approach was what contrary.

[0005] On the other hand, the pneumatic tire which put shallow crest type (V type) slitting (SAIPU) into the block classified by the hoop direction major groove and the minor groove is indicated by JP,3-10913,A in order to raise the Snow traction etc. In addition, some pneumatic tires with which hoop direction die length prepared SAIPU of a V type in the short block like this are known.

[0006]

[Problem(s) to be Solved by the Invention] However, since all above-mentioned tires were hand-of-cut assignment molds, two or more trains formation of V type SAIPU is carried out to hard flow, and proper use of the function of V type SAIPU was not able to do them by the difference in the stress direction with the time of braking and a drive. Moreover, according to this invention persons, when hoop direction die length prepared V type SAIPU in a short block like a well-known technique, even if it changed the direction of stress, it became clear that the rigid improvement effectiveness is very small.

[0007] Then, the purpose of this invention is to offer the pneumatic tire which can reconcile \*\*\*\*\* prevention of improvement in damping force, and a driving wheel etc. by giving directivity to the rigidity of a hoop direction land part.

[0008]

[Means for Solving the Problem] When this invention persons inquired wholeheartedly about the approach of giving directivity to the land part rigidity of the tread pattern of a hand-of-cut assignment mold that the above-mentioned purpose should be attained, they are forming in a hoop direction land part two or more SAIPU of the letter of the abbreviation for V characters which wears after the datum line's rotating and spreads in a side, and came to complete a header and this invention for it being possible to give directivity to land part rigidity.

[0009] That is, while having formed two or more SAIPU of the letter of the abbreviation for V characters which the pneumatic tire of this invention is arranged near the tire equator of the tread side which has hand-of-cut assignment, and is the pneumatic tire which has the hoop direction land part of the unit train prolonged in a hoop direction, or two or more trains, wears said hoop direction land part after the datum line's rotating, and spreads in a side. it is characterized by the hoop direction die length of said hoop direction land part being 3 or more times of width of face. Here, near the tire equator points out 30% of range of the tread width of face centering on the tire equator, and the center line of a hoop direction land part judges by whether it is the within the limits.

[0010] As for said hoop direction land part, in the above, it is desirable to continue over the perimeter, without minding a division slot.

[0011] Moreover, said SAIPU has the two datum lines and, as for the datum line, it is desirable to make the include angle symmetrical with the tire equator at the include angle of 30-60 degrees to the tire equator. Furthermore, as for said SAIPU, it is desirable that spacing of a hoop direction is 3-6mm.

[0012] Since two or more SAIPU of the letter of the abbreviation for V characters which wears after the datum line's rotating and

spreads in a side was formed in the hoop direction land part according to [operation effectiveness] this invention, as the result of the FEM analysis (finite element method) of drawing 1 showed, what (6%) hoop direction land part order rigidity changes a lot became clear by difference of the stress direction at the time of braking and a drive. On the other hand, in that by which order rigidity did not change at all, but hoop direction die length prepared V type SAIPU in the short block in general SAIPU of the direction of the meridian (cross direction), change of order rigidity was small (1%). Although the detail of the reason is unknown, it is presumed that stress (external force) arises in the direction of the arrow head of drawing 2 (a) at the time of braking, the deformation in which an include angle narrows like hoop direction land part 10C of drawing 2 (b) at the time of a drive arises to the deformation in which the include angle of SAIPU spreads like hoop direction land part 10B arising, and change of order rigidity produces hoop direction land part 10A by the difference in the restraint of each part in that case. And by such change of order rigidity, as the result of an example shows, \*\*\*\*\* prevention of improvement in damping force and a driving wheel etc. can be reconciled. In addition, the model conditions of this FEM analysis are as follows.

[0013] This invention article: In the hoop direction land part shown in drawing 2, it is considered as include-angle a45 degree of land part width of face of 25mm, land part height of 9.4mm, and the datum line (symmetry) of SAIPU, spacing b5mm of a hoop direction, and a depth of 8.0mm. General SAIPU article: In the hoop direction land part shown in drawing 7 (a), land part width of face and height also made the same as the above, include-angle a90 degree of the datum line of SAIPU, and spacing and the depth of a hoop direction the same as the above. Block article: What divided the hoop direction land part of this invention article by the division slot by die length of 25mm (hoop direction die length is 1 time of width of face).

[0014] Moreover, since the land part rigidity at the time of braking can be especially raised so that the ratio to the width of face of the hoop direction die length of a hoop direction land part is large when said hoop direction land part is continuing over the perimeter, without minding a division slot, in what follows the perimeter, the operation effectiveness like the above becomes remarkable especially.

[0015] Said SAIPU has the two datum lines, and the datum line can change hoop direction land part order rigidity a lot by difference of the stress direction at the time of braking and a drive, when the include angle symmetrical with the tire equator is being made at the include angle of 30-60 degrees to the tire equator.

[0016] Moreover, when spacing of the hoop direction of said SAIPU is 3-6mm, while moderate land part rigidity is acquired, change of rigidity before and after basing on a difference of the stress direction can also be enlarged more.

[0017]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained, referring to a drawing.

[0018] The hoop direction land part 10 of the unit train prolonged in a hoop direction near tire equatorial CL of the tread side T where the pneumatic tire of this invention has hand-of-cut assignment in the direction of an arrow head as shown in drawing 3, or two or more trains is arranged. This operation gestalt shows the example by which one continuous hoop direction land part 10 which has not been blocked through a division slot is arranged on the tire equator CL.

[0019] Since this invention has the description in the hoop direction land part 10, the block pattern which any are sufficient as other patterns, for example, is shown in drawing 3 is mentioned. The hoop direction land part 10 is divided in this example by two hoop direction slots 3 formed in those both sides. The block 1 of the MEDI eight section is formed in the outside of the hoop direction slot 3, and this block 1 is divided by the hoop direction slot 3, the hoop direction slot 4, and the crosswise slot 5 that extends crosswise. Two or more formation of the crosswise SAIPU 1a is carried out at the block 1. The block 2 of the shoulder section is formed in the outside of the hoop direction slot 4, and it is divided by the hoop direction slot 4 and the crosswise slot 5. Like the block 2, two or more formation of the crosswise SAIPU 2a is carried out.

[0020] In this invention, as shown in drawing 4, two or more SAIPU 11 of the letter of the abbreviation for V characters which the datum line B wears after rotation to the hoop direction land part 10, and spreads in a side (hard flow of an arrow head) is formed. In the illustrated example, since SAIPU 11 is a straight line, it is in agreement with the datum line B. It is desirable that it is the include angle of 20-70 degrees, as for the include angle a which the two datum lines B of SAIPU 11 and tire equator CL make, it is more desirable that it is the include angle which is 30-60 degrees, and it is still more desirable than the reason mentioned above that it is the include angle which is 40-50 degrees. Moreover, it is desirable that the two datum lines B are making the include angle symmetrical with the tire equator.

[0021] As for the spacing b of the hoop direction of SAIPU 11, it is desirable that it is 2-9mm, and it is more desirable than the reason mentioned above that it is 3-6mm. In addition, when acquiring the operation effectiveness like the above-mentioned, from 2mm to the same depth as the height of the hoop direction land part 10 of the depth of SAIPU 11 is desirable. The width of face of the hoop direction land part 10 has 15-50 desirablenmm, when compatible in the braking engine performance, partial wear, and the Snow traction.

[0022] The pneumatic tire of this invention has a desirable radial-ply tire, when acquiring the operation effectiveness like the above-mentioned. Moreover, when obtaining the above-mentioned braking engine performance, the tire for ABS wearing vehicles is desirable, and since the Snow traction engine performance is high, it is useful also as a snow tire.

[0023] Operation gestalt] which is others [ ] The gestalt of other operations of this invention is explained hereafter.

[0024] (1) With the above-mentioned operation gestalt, although it had the hoop direction land part which follows a hoop direction over the perimeter, without minding a division slot, the example was shown, but the hoop direction land part in this invention may be divided through the division slot, as long as the hoop direction die length is \*\* in 3 or more times of width of face. However, it is desirable that hoop direction die length is 5 or more times of width of face, and it is so desirable that there are few division slots. Moreover, the slot parallel to SAIPU of the letter of the abbreviation for V characters of the configuration of a block.

division slot is desirable.

[0025] In addition, in this invention, the hoop direction die length of a hoop direction land part points out the die length from which the both ends of an imaginary line parallel to a hoop direction serve as max, and the width of face of a hoop direction land part points out the value measured on the basis of the endmost part of the both sides of tire shaft orientations (tread cross direction).

[0026] (2) Although the above-mentioned operation gestalt showed the example which forms SAIPU of the configuration shown in drawing 4, as long as it is SAIPU of the letter of the abbreviation for V characters which wears after the datum line's rotating and spreads in a side, any, such as SAIPU of a configuration as shown in drawing 5 (a) - (e), are sufficient.

[0027] Along with the datum line B of a V character mold, as for what is shown in drawing 5 (a), wave-like (RAMEREN) SAIPU 11a is prepared in right-and-left both sides. What is shown in drawing 5 (b) meets the datum line B of a V character mold, and SAIPU 11a of a wave [ SAIPU / 11 / linear ] is prepared in a hoop direction by turns in another side at one side. SAIPU 11 whose thing shown in drawing 5 (c) is a straight line along with the datum line B of a V character mold at one side is formed for linear SAIPU 11b in another side by turns to near an edge to an edge.

[0028] Moreover, SAIPU 11c in which what is shown in drawing 5 (d) was crooked near the edge along with the datum line B of a V character mold is prepared in right-and-left both sides. SAIPU 11d of the curve to which the include angle  $\alpha$  of the datum line B becomes large gradually is prepared in right-and-left both sides as what is shown in drawing 5 (e) approaches an edge.

[0029] (3) Although the above-mentioned operation gestalt showed the example which prepares the hoop direction land part which follows the one perimeter of the arrangement shown in drawing 3, as shown in drawing 6 (a) - (b), two or more hoop direction land parts may be prepared.

[0030] What is shown in drawing 6 (a) is the example which formed two hoop direction land parts 10 in bilateral symmetry, and is divided by the hoop direction slot 3 at the both sides of the hoop direction slot 6 on the tire equator CL. Moreover, the hoop direction land part 10 is divided by the division slot 8 parallel to SAIPU 11 by eight places in the hoop direction.

[0031] What is shown in drawing 6 (b) is the example (a total of 3) which formed two hoop direction land parts 10 in the both sides of the hoop direction land part 10 on the tire equator CL further through the hoop direction slot 7. And as compared with SAIPU 11 of the central hoop direction land part 10, as for SAIPU 11e of the hoop direction land part 10 of both sides, the include angle  $\alpha$  of the datum line B is large. Thus, when an outside enlarges an include angle  $\alpha$ , \*\*\*\*\* of the tire pin center, large section can be controlled suitably.

[0032] (4) Although the above-mentioned operation gestalt showed the example whose patterns other than a hoop direction land part are block patterns shown in drawing 3, the block of not only a rectangular block but the parallelogram, a V character mold, five square shapes, or the curvilinear keynote may be used. Moreover, the block into which the slot went near a center and to near the edge may be used, and any are sufficient as long as a SAIPU configuration does not reduce the effectiveness of this invention, either. Moreover, the hoop direction rib which follows a hoop direction may be prepared.

[0033]

[Example] Hereafter, the example which shows the configuration and effectiveness of this invention concretely is explained. In addition, each performance evaluation of a tire was performed as follows.

[0034] (1) dry cleaning and -- The real vehicle (ABS wearing vehicle) was equipped with the wet braking engine-performance tire, and the characteristic estimated the distance which the loading condition of one-person entrainment takes slowing down to 20 km/h, making it run a wet road surface with a depth of 1mm and a dry road surface (for all to be asphalt road surfaces), and applying damping force by initial velocity 90 km/h. In addition, evaluation shows elegance (example 1 of a comparison) conventionally by the characteristic display (dry cleaning and wet average) when being referred to as 100, and shows such a good result that a numeric value is large.

[0035] (2) The real vehicle (FR vehicle) was equipped with the partial wear engine-performance tire of the pin center, large section, it ran by the loading condition of one-person entrainment, and the partial wear ratio (abrasion loss of the abrasion loss / shoulder section of the pin center, large section) when average abrasion loss reaches to 50% about a driving wheel was measured. It is uniform wear and a good result is shown, so that an evaluation result is close to 1.0.

[0036] (3) Based on Snow traction engine-performance SAE-J1466, using the Snow traction circuit tester, it ran by speed per hour 8 km/h, and the average of the slip ratio to 20 - 300% of slip ratio - a wear multiplier was incorporated on the hardened snow way (n= 10 pieces).

[0037] In the tread pattern shown in example 1 drawing 3, it considered as include-angle  $\alpha 45$  degree of width of face of 25mm of the hoop direction land part 10, land part height of 9.4mm, and the datum line of SAIPU 11, spacing b5mm of a hoop direction, and a depth of 8.0mm. Moreover, it considered as include-angle  $\alpha 90$  degree of the datum line of SAIPU 1a of block 1, spacing b5mm of a hoop direction, and a depth of 8.0mm, and considered as include-angle  $\alpha 90$  degree of the datum line of SAIPU 2a of block 2, spacing b5mm of a hoop direction, and a depth of 8.0mm.

[0038] This pattern was adopted as size 225 / radial-ply tire of 50R16, and each above-mentioned performance evaluation was performed. The result is shown in Table 1.

[0039] The example 1 (conventional article) of a comparison

In the tread pattern shown in drawing 7 (a), it considered as include-angle  $\alpha 90$  degree of width of face of 25mm of the hoop direction land part 10, land part height of 9.4mm, and the datum line of SAIPU 11, spacing b5mm of a hoop direction, and a depth of 8.0mm. Other parts are the same as an example 1, adopted this pattern as the radial-ply tire of the same size, and performed each above-mentioned performance evaluation. The result is shown in Table 1.

[0040] In the tread pattern shown in example 2 drawing 7 (b), it considered as include-angle  $\alpha$  75 degree of width of face of 25mm of the hoop direction land part 10, land part height of 9.4mm, and the datum line of SAIPU 11, spacing b5mm of a hoop direction, and a depth of 8.0mm. Other parts are the same as an example 1, adopted this pattern as the radial-ply tire of the same size, and performed each above-mentioned performance evaluation. The result is shown in Table 1.

[0041] In the tread pattern of example of comparison 2 example 1, except V mold groove (width of face of 5mm) parallel to SAIPU 11 having divided the hoop direction land part 10 for every hoop direction die length of 30mm, the radial-ply tire was produced like the example 1, and each above-mentioned performance evaluation was performed. The result is shown in Table 1.

[0042]

[Table 1]

	実施例 1	比較例 1	実施例 2	比較例 2
制動性能	1 0 5	1 0 0	1 0 3	9 6
偏摩耗性能	1. 5	3. 1	2. 3	1. 3
スノートラクション性能	1 0 3	1 0 0	1 0 1	1 0 5

As the result of Table 1 showed, in this invention article, improvement in damping force, and \*\*\*\*\* prevention of a driving wheel and the Snow traction engine performance were able to be reconciled. In the example 1 which is the range especially whose include angle  $\alpha$  of SAIPU is 30-60 degrees, the effectiveness was remarkable. On the other hand, in the example 1 of a comparison in which crosswise SAIPU was formed, in the example 2 of a comparison which each of braking engine performance, \*\*\*\*\* engine performance, and Snow traction engine performance is inferior in, and blocked the hoop direction land part, although the rigidity of both directions fell by blocking and the Snow traction engine performance and partial wear improved, the braking engine performance did not improve but it fell sharply rather.

[Translation done.]

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**CLAIMS**

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[Claim(s)]

[Claim 1] It is the pneumatic tire whose hoop direction die length of said hoop direction land part is 3 or more times of width of face while being the pneumatic tire which has the hoop direction land part of the unit train which is arranged near the tire equator of the tread side which has hand-of-cut assignment, and is prolonged in a hoop direction, or two or more trains and having formed two or more SAIPU of the letter of the abbreviation for V characters which wears said hoop direction land part after the datum line's rotating, and spreads in a side.

[Claim 2] Said hoop direction land part is a pneumatic tire according to claim 1 which is continuing over the perimeter, without minding a division slot.

[Claim 3] It is the pneumatic tire according to claim 1 or 2 with which said SAIPU has the two datum lines, and the datum line is making the include angle symmetrical with the tire equator at the include angle of 30-60 degrees to the tire equator.

[Claim 4] claims 1-3 whose spacing of a hoop direction of said SAIPU is 3-6mm -- a pneumatic tire given in either.

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[Translation done.]